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Please find below and/or attached an Office communication concerning this application or proceeding.

Response to Office Action

As Attached

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Title: **Architecture for converged broadband wireless communications**
Application No. **09/927,075**
Mailing Date: July 18, 2005

Date: September 15, 2005

Dear Mr. Genack and Mr. Foster:

Thanks very much for your letter regarding our patent dated on July 18, 2005.

After careful reviewing of your comments, we have provided the following responses on this matter:

We have studied in details all your referenced patents as listed in the "Notice of References Cited". Before we analyze our patent application, we need to point out that these four referenced patents are completely different from our patent, and further more, they focus on separate unrelated issues which we conclude as follows:

[Reference 1 by Jorgensen, Jacob W. / US-6,862,622]

The key points of this patent include:

- It is a standard BWA (Broadband Wireless Access) Point-to-Multipoint (P-MP) architecture based on packet network architecture defined in IEEE802.16 specification,
- It is focused on network/transport layers (for example, TCP/IP layers) only,
- It is on P-MP model only,
- It is based on IEEE 802.16 model only (proposed and discussed in early 1999),
- It is on scheduler design for resource management and dynamic bandwidth allocation,
- It is on TDMA/TDD model only,

- Lots of contents are IEEE802.16 common specifications on fixed BWA system proposed and defined in early 1999.

This patent is on Single Closed Architecture (BWA) Only.

[Reference 2 by Willhoff, Steven J. / US-5,887,262]

The key points of this patent include:

- It is collaborating non- smart antenna mobile station to the smart antenna wireless system,
- It is on transmission grouping in TDMA only,
- It is on advanced resource allocation of TDMA frequency channels,
- Several mobile stations work together as a group to support smart antenna transmission.

This patent is on Single Closed Architecture (TDMA with Smart Antenna) Only.

[Reference 3 by Hagen, W. Alexander / US-2002/0075844]

The key points of this patent include:

- It is focused on Network Access Server (NAS) only,
- It is to allow connection between wireless terminal and private networks through public network connection,
- The wireless terminal is a short-distance "mobile" terminal with Bluetooth (IEEE802.15) and Wireless LAN (IEEE802.11) interfaces. In fact, it is not a TRUE seamless mobile terminal. It only supports local area short-distance mobility.
- The wireless terminal uses Mobile-IP protocol supporting short-distance mobility only which had been a popular solution since 1994.
- NAS manages all related access control and resource management for wireless terminal,
- NAS maps the security and encryption information between public network and private network,
- The wireless network is a distributed access network,
- Most contents are on generic networks' know-how only.

This patent is on Single Closed Architecture (IEEE802.11/15 network with Mobile-IP) Only.

[Reference 4 by Kerr, Michael A. / US-2002/0142844]

The key points of this patent include:

- It is nothing to do with wireless systems, and the inventor has no wireless background knowledge in the field,
- It is a gaming system,

It does not make any sense to pickup a single piece of information from one patent to compare with that in another patent. Patent should be judged as a whole body, especially for system architecture patent.

After we understand well these referenced patents, let's explore the detailed patentable values of our patent:

- The most important points disclosed from our invention is: Different wireless standards (or called Air Interfaces) are mapped into specific Open interface parameters defined in the Common Air Interface Basic Input/Output System (CAI-BIOS), which is an extended BIOS architecture for the future converged broadband wireless communications, for example, Intel's Wireless BIOS defined in 2004 for the WiMAX system, etc.
- The converged wireless terminal is based on open wireless architecture, rather than traditional coupling of several single-standard, closed-architectured air interfaces,
- All air interface modules of the converged broadband wireless systems are open modules, rather than closed standard-specific system module,
- Based on CAI-BIOS open architecture, different wireless standards (in the form of open air interface parameters) can be stored in SIM card or memory stick, etc by CAI-BIOS definition, which is a breakthrough invention in the wireless communication industry,
- The converged broadband wireless infrastructures are Packet Division Multiplexed (PDM) open network architecture through Common Access Point (CAP) defined in this invention. Basically, CAP is a functional combination of traditional Base Station and Wireless Router supporting open wireless architecture and open network architecture.
- The converged broadband wireless networks are based on All-IP End-to-End direct signaling with open PDM core network infrastructure.
- The CAP system modules (Control Processing, Baseband Processing, Broadband Transceiver and RF/IF) of the converged broadband wireless are based on CAI-BIOS open architecture, rather than closed standard-specific processing platform.
- The example converged wireless terminal in FIG.4 is an implemental terminal system based on CAI-BIOS open core where different wireless standards' modules (by open interface parameters) can be installed by external SIM Card or Memory stick, or downloaded from Internet by CAI-BIOS defined interface. In addition, Security, Information Recognition and Bandwidth-on-Demand are three very important elements of future Service-Oriented infrastructure of this converged broadband wireless system.

Our patent is a System Architecture patent, and the full information disclosed in our patent are the very important and practical design reference for a wireless system architect in the field. The system architecture patent should be viewed as a whole system rather than

dividing into small single piece on judgment, for example, smart antenna issue, storage issue, fingerprint issue, etc. In addition, the system architecture patent does not need to employ detailed development of each system module including protocol algorithm and interface definition, etc.

The wireless industry is rapidly transitioning from proprietary architecture to more flexible, cost effective open architecture systems. This transition is creating interesting challenges for developers, manufacturers, integrators, operators and end-users as they wrestle with complexities of open wireless systems. Open wireless system defines the open interfaces in wireless networks and systems, including base-band signal processing parts, RF parts, networking parts, and OS and application parts, so that the system can support different industrial standards and integrate the various wireless networks into an open broadband platform. For comparison, Software Defined Radio (SDR) is only a radio in which the operating parameters including *inter alia* frequency range, modulation type, and/or output power limitations can be set or altered by software. Therefore, SDR is just one of the implemental modules of the open wireless system.

"Any single-architecture wireless system, including 3G, HSDPA, WiMax, etc, is a transitional solution only, and will be replaced by open wireless architecture system very soon where various different wireless standards can be integrated and converged on this open platform", said Prof. Wei Lu (Willie), consulting professor of Stanford University and former chief architect of Infineon Technologies.

Therefore, we appreciate it very much if you can understand the key points and values disclosed in our invention of the system architecture for converged broadband wireless communications.

Now, let's go ahead to discuss on your comments one by one.

In response to your comment No.3 on Page 2, our argument is:

As our patent is on system architecture invention, the current disclosed information is enough for a skilled wireless architect to design the real system of our invention. In fact, the disclosed information from FIG.2, FIG.3 and FIG.4 together with the description of the preferred embodiment are the fundamental materials for a wireless architect to design the system of our invention. The system architecture does not need to go deep into the hardware and software implementation of the detailed modules.

A regular product development procedure (as executed in Siemens, Intel and Samsung, etc) is: Market research, concept engineering, system architecture, product definition, product development. Detailed hardware and software information is only required in the product definition and product development phases. Furthermore, in this product development procedure, the system architecture is the most important and critical part of the whole product development project because it needs to determine the system blueprint

based on existing standards, future standards, budget control, market trends and engineering issues. In addition, a qualified wireless system architect must follow the important criteria: While product can change every 18 months, the primary system architecture should remain unchanged for at least ten years. For example, GSM has improved its product frequently with more feature and applications, but the main system architecture never changed since 1992.

In fact, after our invention was disclosed and published on Feb. 13, 2003, there were already several companies copying our invention and delivered similar products to the market (at least one US company delivered similar product in Korea and Europe).

We hope you satisfy with our response on this comment.

In response to your comment No.5 on Page 3 and Page 4, our argument is:

We have corrected all the wordings based on your suggestion and advices. Please see the amended Claims in the attached sheet.

Meanwhile, we agree to remove Claim 7 which claims nothing beyond that which Claim 1 claims.

Claim 2 is necessary because it details the CAP functions: on the wireless side, CAP supports various air-interface link to the converged wireless terminal; on the network infrastructure side, CAP supports various networking capabilities to the PDM backbone network.

In Claim 5, the "said open base-band / control processing engine, the said broadband transceiver as well as the said radio frequency unit" refer to both the converged wireless terminal and the common access point.

In Claim 6, we totally agree to replace "said air interface modules" with your suggested "said software modules that provide said air interfaces to said CAI-BIOS"..

In Claim 8, the example converged wireless terminal can be depending on Claim 1 or independent as a sample product design. To make it simple, we just replace "said" with "the" to become an independent claim. Please feel free to amend it if you think dependent claim is more appropriate.

In response to your comment No.7 on Page 5-8, our argument is:

On Claim 1:

As we replied in the beginning of this response, after complete review of Jorgensen's patent, our invention is totally different from Jorgensen's patent in that:

1. Jorgensen's patent is focused on IEEE802.16 platform, especially 802.16.1 and 802.16.3 which was proposed and defined in early 1999, where service convergence in the Network/Transport layers was the main issue. IEEE802.16 came from the DOCSIS (cable modem standard) platform, and evolved to Non-DOCSIS solution with more focuses on wireless IP packet communication, and service convergence supporting various service platform.
2. IEEE 802.16 has different working groups on TDMA and OFDM, but no group on CDMA because CDMA is not a good technology for broadband wireless access (BWA) and IEEE 802.16 is a BWA standard, though many IEEE802.16 members had discussed a while on CDMA for BWA (for example, CDMA proposal from InterDigital for IEEE802.16 in early 1999).
3. Jorgensens' patent is mainly focused on Close architecture based on IEEE802.16 standard. Though it may support several wireless air interface protocols, technically the system can only support CO-EXISTENCE rather than CONVERGENCE because the architecture disclosed in his patent is almost the same as defined in the IEEE802.16 specifications, early 1999.
4. Some figures in Jorgensens' patent (for example, FIG.2A) were well known earlier all over the world, and it does not mean anything if someone just copies into the work.
5. By analyzing the claims of Jorgensen's patent, he neither claims anything on open system architecture, nor claims any specific wireless convergence solutions.
6. Jorgensen's patent is limited to P-MP (point-to-multipoint) architecture only which was defined in IEEE802.16. This kind of P-MP is a close architecture, and IMPOSSIBLE to execute whatever wireless standards, theoretically and practically, because normal cellular mobile network (on per call basis) is a point-to-point architecture, but broadband wireless access system can be Point-to-point, point-to-multipoint or even multipoint-to-multipoint architecture.

Willhoff, as we replied earlier, disclosed a way to collaborate non-smart antenna mobile stations to the smart antenna wireless system. But Willhoff never focused on converged platform to support various wireless standards. In fact, Willhoff's patent is on transmission grouping scheme in TDMA system to support smart antenna transmission.

Therefore, at the time that the invention was made, it would be IMPOSSIBLE to one of ordinary skill in the art to modify either Jorgensen's patent or Willhoff's patent to our invention because they are TOTALLY different.

When an experienced wireless professional looks at Jorgensen's patent, he/she will easily realize the IEEE802.16 system which is obvious. However, there is no reason he/she would come out the invention disclosed in our patent.

Also, people with ordinary skill in the art would not simply think of smart antenna technology for any systems because of its technical and business tradeoffs. Using of smart antenna involves many issues including spectrum, cost, system architecture, service area and network optimization, etc.

On Claim 4:

1. Again, Jorgensen's patent is only dealing with IEEE802.16 wireless IP transmission while our disclosed invention focuses on open air interfaces of IP connections.
2. In Jorgensen's patent, the CPE (customer premise equipment) is a standard-specific (for example, 802.16 or 802.11) terminal. But in our patent, the converged wireless terminal is an open terminal supporting various air interfaces via open interface parameters.
3. In Jorgensen's patent, the IP connection is based on P-MP 802.16 definition. But in our patent, the IP flow can be in the form of IP/UMTS, IP/802.11, IP/802.15, IP/802.16 and/or IP/PHS, etc – end-to-end All-IP connection.

Therefore, Claim 4 is much different from Jorgensen's patent.

On Claim 5:

- The CAI-BIOS (Common air interface basic input/output system) of our invention maps various air interfaces into open interface parameters defined in CAI-BIOS. It mainly deals with layer 1 and layer 2 parameters. Dynamic bandwidth allocation (DBA) is only one sub-layer within layer 2, above the MAC (medium access control) sub-layer. So, our invention is completely different from Jorgensen's patent.
- Our invented CAI-BIOS is an extended BIOS architecture supporting converged open wireless architecture. CAI-BIOS is not just a simple BIOS, it must define efficient mapping between common air interfaces and open processing platforms (including control, baseband and transceiver).
- Open architecture means "user can buy different parts from different vendors", and CAI-BIOS defines the open interfaces amongst the different parts. Hence, CAI-BIOS is not just handling the basic task to control bidirectional communication between an electronic device and one or more users. Instead, CAI-BIOS performs more functions such as multi-layer Bus and elastic buffering, etc in addition to open interfaces.

Therefore, it is definitely not obvious to explicitly link them together.

On Claim 6:

- To define an air interface module is not an easy job. In our disclosed invention, the air interface modules are defined as open modules based on CAI-BIOS requirements. The module must be efficient for processing, porting, installing and transmitting over the air.
- In our disclosed invention, the air interface modules are capable of supporting non-lossy switching of various air interfaces (to support fully service-oriented architecture for users) which is extremely important for open wireless systems.

- In our disclosed invention, the local storage of air interface modules and uploading of air interface modules must meet the requirements of the CAI-BIOS definition for the open wireless systems.

Therefore, it is not just simply storing software in local computer or simply downloading or uploading software from/to remote network.

In response to your comment No.8 on Page 8-9, our argument is:

On Claim 3:

- In our disclosed invention, the converged wireless terminal and the common access point are all open architecture systems, and therefore they can be reconfigurable, programmable and software definable.
- In wireless communications, re-configurability, programmability and software definability are always challenges especially for cellular mobile communications due to constrains of terminal power, available spectrum and wireless access control, etc. How to design a flexible mobile terminal supporting different air interfaces is a very difficult job for wireless engineers, scientists and technologists. As we know, it is always a tradeoff between flexibility and efficiency. Normally, if the mobile terminal can support re-configurability, it must consume more power and spectrum which are inefficient and unacceptable in commercial market because wireless spectrum is extremely expensive and limited, and terminal power is the critical issue in the mobile communications.
- Open wireless architecture can solve this problem very well, because it defines the open interfaces in wireless baseband system, RF system, network system and application and service system, so that each function module can become independent in term of operations, executions and maintenance, etc. Open architecture terminal system (or called Converged wireless terminal in our patent) can support various air interfaces as long as these air interfaces are mapped to open interface parameters defined in our invented CAI-BIOS specifications. However, the open wireless terminal does not have to implement all the functions of the various air interfaces in the terminal which tremendously saves the terminal power. The basic system framework of the converged wireless terminal is open, and necessary functional modules can be added or dropped subject to service requirement, user requirement and system requirement. Similar to the laptop architecture (based on open computer architecture), the basic system framework of an open wireless terminal includes only CAI-BIOS core, processor core and transceiver which construct the basic "motherboard" of the open terminal.
- As replied in the beginning of this response, Hagen's patent is focused on allowing connection between wireless terminal and private networks through public network connection, and the main focus is on the Network Access Server (NAS) which manages related access control and resource management for the wireless terminal. Also, the re-configurability is only in the upper layer rather than in the lower layers. In addition, Hagen's patent is only dealing with IEEE802.15 and

IEEE802.11 local access domain with mobile-IP protocol (this protocol supports local mobility rather than seamless mobility). So Hagen's patent is very limited in terms of lower layer configurability and automatic selection.

- Similar in Jorgensen's patent, his patent is only dealing with higher layer (TCP/IP layer) flexibility on Point-to-Multipoint model only. Again, it is on IEEE802.16 model only – Any professional with ordinary skill in the art can easily find out this fact (proposed and defined in the IEEE802.16 working group in early 1999).
- Willhoff's patent is dealing with resource allocation of TDMA frequency channels on transmission grouping to support smart antenna systems. He never discussed on solutions to automatically or manually select any of the available air interface protocols. Instead, Willhoff's patent is focused on TDMA only.

In a word, it would not have been obvious to one of ordinary skill in the art to modify others' patents to the inventions disclosed in our patent because of the in-depth technical difficulties of the subject.

In response to your comment No.9 on Page 9-10, our argument is:

- As we stated earlier, our patent is a system architecture patent. A system architecture patent should take it as a whole, rather than dividing into single pieces on judgment. Jorgensen discussed Dynamic Bandwidth Allocation (DBA), but it was only limited to dynamically allocating channels (both TDM channels and frequency channels) within IEEE802.16 transmission technology of Point-to-Multipoint model. However, our DBA of disclosed invention is based on open wireless architecture model supporting various air interfaces. So our DBA is of two dimensional – both in the channels and different air interfaces, based on open architecture.
- Hagen used Network Access Server (NAS) to manage related access control and bandwidth allocation for wireless terminal, but again it was limited to IEEE802.15 and 802.11 only. Furthermore, because 802.11 and 802.15 are working in Unlicensed bands, the resource management becomes much difficult due to lack of users' information, providers' information and network optimization in specific service area. So Hagen's patent is only limited to local area domain with limited mobility, meaning the flexibility of bandwidth allocation is limited.
- Our disclosed patent is based on open wireless architecture, and therefore it is the best solution to support shared spectrum strategy which greatly improves the spectrum utilization and radio transmission efficiency. As a result, the system resource (bandwidth, processing, service traffic, etc) can be truly dynamically managed. To make it clear, for example, by using our converged wireless terminal of our patent, the user only consumes the ACTIVE spectrum with ACTIVE air interface when in communications, and release the spectrum when not in communications, though the single converged terminal can support various different air interfaces. For your reference, we are the world's FIRST to propose open wireless architecture for the converged broadband wireless communications.

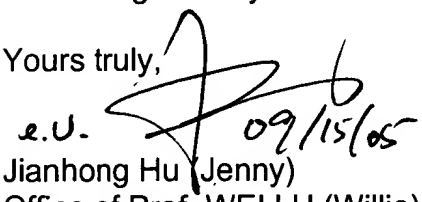
- Again as mentioned in last response to comment 8, it is very difficult and requires special in-depth expertise to make the modification of others' patents (Jorgensen, Hagen and Willhoff, etc) on this purpose.
- Kerr's patent is nothing to do with much wireless systems. In wireless communication, many issues are different from wired communications. Traditional wireline security technologies are limited to higher layers only, for example, security in the application layer, session layer and transport layer. But in wireless communications, the security must be implemented into MAC layer (medium access control) and lower to secure transmission over the air because anyone can easily access the wireless transmission medium and attack the network, service and user information, etc. Hence, the security requirement in our patent is especially for converged wireless communications, which is different from that in gaming system.
- Again, the value of this example converged wireless terminal of our disclosed invention includes the function and feature definitions of the invented converged wireless terminal as a whole. It does not make any sense if we just talk about single small piece inside a claim. For example, if we just talk about individual issues in Jorgensen's patent, it is just IEEE 802.16 specifications proposed in March 1999.

Therefore, we strongly do not believe that one ordinary skill in the art can have the ability to modify the referenced patents to come out our disclosed invention.

Lastly, we hope you find this reply useful, valuable and satisfactory.

If anything else is needed, please feel free to contact me by e-mail, etc.
Thanks again for your time and favorable consideration in advance.

Yours truly,



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Encls. : Amended Claims following your comments

Amended Claims following your comments

1.An architecture for Converged Broadband Wireless Communications CHARACTERIZED BY:

(1) A converged wireless terminal comprising:

a) a block radio-frequency and intermediate-frequency and digital broadband transceiver for converting between the base-band signal and the radio frequency, and
b) a block base-band signal and control signal processing engine for processing various wireless algorithms and protocols, and
c) a Common Air Interface Basic Input/Output System (CAI-BIOS) for the mapping and controlling of different wireless air-interfaces (wireless standards) to the said broadband transceiver and the said processing engine, and
d) a SIM (Smart Integrated Memory) card or Memory Stick for the loading of different air interfaces and their software modules to the said CAI-BIOS

(2) A Common Access Point (CAP) comprising:

a) a block radio-frequency and smart antennas and broadband transceiver for converting between the base-band signal and the radio frequency, and
b) a block base-band signal and control signal processing engine for processing various wireless algorithms and protocols, and
c) a Common Air Interface Basic Input/Output System (CAI-BIOS) for the mapping and controlling of different wireless air-interfaces (wireless standards) to the said broadband transceiver and the said processing engine, and
d) a group of software modules providing various air interfaces (wireless standards) to the said CAI-BIOS, and
e) a block network interface unit for connecting to the backbone wireline networks.

(3) An All-IP (Internet Protocol) Packet Division Multiplex (PDM) backbone or core network comprising:

a) Conventional PDM network, or
b) Public or private PDM network.

2. The architecture for Converged Broadband Wireless Communications of claim 1 wherein: said Common Access Point supports various network interfaces (for example, Fiber Optic, ATM, Ethernet, Digital Subscriber Line, Cable, etc) to the said PDM backbone network through wireline link; said Common Access Point supports various air interfaces (for example, GSM (Global System for Mobile Communication)/GPRS (General Packet Radio Service), W-CDMA (Wideband Code Division Multiple Access), UMTS (Universal Mobile Telecommunications Service), IEEE 802.11, 802.15, 802.16 and Wireless Local Loop, etc) to the said converged wireless terminal through wireless air link; said converged wireless terminal supports said air interfaces to the said common access point through wireless air link.

3. The architecture for Converged Broadband Wireless Communications of claim 1 wherein: said converged wireless terminal and said common access point are all open function units and can be reconfigurable, programmable and software definable; said converged wireless terminal and said common access point can automatically or manually run in any of the said air interfaces subject to the service availability; said common access point can automatically or manually run in any of the said network interfaces subject to the service availability.

4. The architecture for Converged Broadband Wireless Communications of claim 1 wherein: said converged wireless terminal and said common access point are communicating through All-IP end-to-end direct signaling and protocol; said converged wireless terminal and said common access point support integrated services of voice, data and video over All-IP protocol and signaling.

5. The architecture for Converged Broadband Wireless Communications of claim 1 wherein: said CAI-BIOS performs the mapping and controlling between said different air interfaces and the said open base-band/control processing engine, the said broadband transceiver as well as the said radio frequency unit of the said converged wireless terminal and the said common access point; said CAI-BIOS is the key unit of the said converged wireless terminal and the said common access point; said CAI-BIOS provides information on said air interfaces including necessary transmission parameters, modulation parameters, channel parameters, access control parameters, dynamic bandwidth allocation parameters and other specific air interface parameters.

6. The architecture for Converged Broadband Wireless Communications of claim 2 wherein: said software modules that provide said air interfaces to said CAI-BIOS in said common access point can be stored in said common access point disks or uploaded from the said PDM backbone networks or uploaded from other remote networks; said software modules that provide said air interfaces to said CAI-BIOS in said converged wireless terminal can be loaded in said SIM card or memory stick.

7.REMOVED as agreed.

8. A sample product of the converged broadband wireless terminal CHARACTERIZED BY:

a) Air Interfaces Options (automatically or manually), and
b) Security (finger print, etc), and
c) Information recognition (voice recognition, pattern recognition, etc)
d) Bandwidth on Demand (Quality of Service Centric)
e) SIM card or memory stick